Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of

Revision of Part 15 of the Commission's	)	ET Docket No. 13-49
Rules to Permit Unlicensed National	)	
Infrastructure (U-NII) Devices in the	)	
5 GHz Band	)	

To: The Commission

COMMENTS OF SAVARI NETWORKS

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SUMMARY

Savari specializes in mobilizing Intelligent Transportation Systems (ITS) with cost-effective wireless devices in order to improve roadside infrastructure while connecting vehicles and drivers to a network. ITS holds the answer to many of the transportation problems currently plaguing our Nation.

NTIA has already identified the potential that U-NII devices may not be able to sense (and hence avoid) DSRC signals, presenting risks that U-NII devices may interfere with DSRC operations. There is much information sharing that needs to occur between the DSRC and U-NII communities in order to analyze and address the sharing risks raised by NTIA and as may be otherwise identified. The *NPRM* poses technical questions regarding the optimal sharing technique (*e.g.*, sensing, geo-location, pilot channel). Before addressing these issues, the FCC must first address risks identified by NTIA and determine whether sharing of the 5.9 GHz Band with unlicensed devices will not compromise the safety of the traveling public. Accordingly, the public record on this *NPRM* cannot possibly form the basis for definitive action by the Commission to permit the entry of unlicensed devices into the 5.9 GHz band. The proposal to share spectrum allocated for safety of life services with unlicensed devices must face a high burden of demonstrating that DSRC will not be compromised.

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Savari, Inc. ("Savari"), by its attorneys, and pursuant to Section 1.405 of the FCC's Rules, 47 C.F.R. § 1.405, hereby respectfully submits its Comments regarding the *Notice of Proposed Rulemaking*[1] issued by the Commission in the above-captioned proceeding.

I. INTRODUCTION & STATEMENT OF INTEREST

Savari specializes in mobilizing Intelligent Transportation Systems (ITS) with cost-effective wireless devices in order to improve roadside infrastructure while connecting vehicles and drivers to a network. ITS holds the answer to many of the transportation problems currently plaguing our Nation. ITS is comprised of existing and new technologies, including information processing, sensors, communications, control and electronics. Combining these technologies in innovative ways, and integrating them into multimodal transportation systems, will save lives, money, time and resources.

Savari was formed in 2008 by industry veterans from Nokia, Siemens, and Qualcomm Atheros with the mission of providing wireless infrastructure to the ITS market. Savari is also

[1] *Revision of Part 15 Part of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Notice of Proposed Rulemaking, FCC 13-22, 28 FCC Rcd 1769 (2013) ("*NPRM*").

the chosen supplier for the United States Department of Transportation's (USDOT) SafeTrip-21 and E-VII programs, and maintains close partnerships with the automotive Office of Emergency Medical Services (OEMS), traffic controller companies, system integrators and semiconductor chipset vendors.

Savari ITS Products and Services

Savari focuses on three primary ITS applications: safety, e-payment and traffic engineering. In the area of transportation safety, Savari is working on many critical goals, including: reduction of traffic-related fatalities and injuries, reducing congestion on highways by offering safety applications in cooperative intersections collision avoidance systems, signal violation warnings, in-vehicle signing for static advisories (sharp curves, school zones) and dynamic advisories (temporary work zones, weather impacts, presence of emergency vehicles, congestion ahead, etc.), and vehicle-to-vehicle communications.

In the area of e-payment, Savari provides roadside wireless infrastructure and smart tags to enable advanced electronic payment systems, regardless of radio technology. Savari's e-payment applications include toll collection, free-flow tolling, gas payment, drive through payment and parking lot payment. Additionally, in the area of traffic-engineering, Savari delivers dynamic information to mobile devices (both in-vehicle or nomadic handheld devices such as cell phones/personal digital assistant devices), and generates alerts regarding static roadway features such as school zones, high hazard locations, parking locations and traffic restrictions (one-way, no left turn). Savari's applications in traffic engineering include traffic congestion data collection, weather data collection, road surface conditions data collection, traffic signal priority for emergency and transit vehicles and a parking spot locator. Savari is also a participant in the US DOT sponsored test bed and the Crash Avoidance Metrics Partnership ("CAMP").[2]

Savari employs leading-edge technologies to provide travelers seamless access to real-time roadway information and vehicular safety while in transit. Two of these leading-edge technologies employed by Savari are based on IEEE 802.11p and DSRC standards. IEEE 802.11p is a draft amendment to the IEEE 802.11 standard to add Wireless Access in the Vehicular Environment (WAVE). It defines enhancements to 802.11 required to support ITS applications. This includes data exchange between high-speed vehicles, and data exchange between the vehicle and the roadside infrastructure in the licensed ITS band of 5.9 GHz (5.85-5.925 GHz). Savari's ability to develop and deliver critical transportation safety services for the public will be undermined if, as a result of this rule-making proceeding, the Commission allows unlicensed devices to operate in the 5.9 GHz band as proposed in the *NPRM*.

II. BACKGROUND ON DEDICATED SHORT RANGE COMMUNICATIONS

DSRC is a principal enabling technology for US DOT's multi-year Connected Vehicle research program, which envisions reducing or eliminating vehicle crashes through a fully connected transportation system uniting drivers, vehicles, wireless devices and the road infrastructure.[3] A Connected Vehicle future envisions that transportation data will be exchanged instantaneously among vehicles in proximity to one another ("vehicle-to-vehicle" or "V2V" wireless communications) as well as with the road infrastructure ("vehicle-to-roadside" or "V2I" wireless communications) to enhance mobility and improve safety. DSRC is the critical link for

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[2] CAMP is a partnership of original vehicle OEMs created to accelerate the implementation of crash avoidance countermeasures to improve traffic safety.

[3] *See generally* http://www.its.dot.gov/connected_vehicle/connected_vehicle.htm (viewed May 10, 2013).

V2V and V2I communications, providing 360 degree "visibility" so that vehicles can "see" nearby vehicles in all directions and know of roadway conditions that the driver cannot see. As described by US DOT, DSRC encompasses two-way short-to-medium-range wireless communications capability that permits very high data transmission critical in communications-based active safety applications.[4]

DSRC uniquely meets the basic communications requirements for most Connected Vehicle safety applications. These requirements include:

- Range of up to 1000 meters;
- One-way and two-way directionality, both to and from the vehicle;
- Both point-to-point and broadcast communications capabilities; and
- Latency of much less than 50 milliseconds (orders of magnitude lower than most other wireless communications technologies).

Most significant, DSRC is the only wireless data communications technology that has the requisite low latency – the time it takes data to reach its destination – with high reliability that is critical for the transmission of safety messages. Delayed delivery of a vehicle safety message could reduce its validity. For example, the vehicle location identified in the message can be off by several to tens of meters with several hundreds of millisecond latency, increasing linearly with vehicle speed. When vehicles are traveling at highway speeds, any delay – even in milliseconds -- in the transmission could adversely impact the safety of the traveling public. US DOT has concluded that DSRC is "the only available technology in the near-term that offers the latency, accuracy, and reliability needed for active safety" Connected Vehicle applications.[5]

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[4] US Department of Transportation, Research and Innovative Technology Administration, "DSRC: The Future of Safer Driver Fact Sheet," accessible at http://www.its.dot.gov/factsheets/dsrc_factsheet.htm. (viewed May 9, 2013) ("Safer Driver Fact Sheet').

[5] *Id.* Studies have compared LTE (cellular technology) and DSRC to provide the necessary latency and reliability under the relevant operating conditions. While DSRC does not provide

A. How DSRC Will Save Lives

The great promise of the Connected Vehicle program, and the DSRC enabling technology, is to significantly reduce the numbers of vehicle crashes. In recent testimony before the Senate Committee on Commerce, Science and Transportation, David Strickland, Administrator of the National Highway Traffic Safety Administration ("NHTSA") stated that V2V applications "could potentially address about 80 percent of crashes involving non-impaired drivers once the entire vehicle fleet is equipped with V2V technology"[6] Administrator Strickland further explained:

> We believe V2V technology will complement and ultimately merge with the advanced braking systems and other crash avoidance technologies that we are currently evaluating to shape the future of motor vehicle safety. V2V will give drivers information needed to make safe decisions on the road that cameras and radars just cannot provide. This added capability not only offers the potential to enhance effectiveness of current production crash avoidance systems, but also enables more complex crash scenarios, such as those occurring at intersections, to be addressed.[7]

Moreover, according to NHTSA, the V2V program is reliant on the availability of the DSRC technology that operates in the 5.9 GHz Band: "This spectrum is uniquely capable of supporting a number of safety applications that require nearly instantaneous information relay.[8]

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ubiquitous coverage as does LTE, DSRC specifically addresses localized and mission/revenue critical applications with requiring the users to make a connection decision. In addition, DSRC bandwidth capacity is sufficient to meet greater than 100 percent of worst-case load, whereas LTE capacity is insufficient to meet less than five percent of worst-case load. LTE is also a subscriber fee based serviced. A low latency dedicated spectrum is absolutely necessary for the success of mission critical applications for the infrastructure.

[6] Testimony of the Honorable David L. Strickland, Administrator, National Highway Traffic Safety Administration, Before the Senate Committee on Commerce, Science, and Transportation, Hearing on "The Road Ahead: Advanced Vehicle Technology and its Implications," 4 (May 15, 2013) ("Strickland Testimony").

[7] *Id*.

[8] *Id.*

DSRC functions by enabling the instantaneous exchange of information among vehicles and the roadside that will enable vehicles to deploy crash avoidance countermeasures designed to avoid, or mitigate the effectives of, collisions with other vehicles, roadside objects or pedestrians.[9] These crash avoidance countermeasures include alerts and in-vehicle signage to drivers to address specific crash scenarios or potentially dangerous highway conditions, as well as generic public safety alerts. DSRC may exchange data to enable tolling, commercial carrier credentialing, vehicle diagnostics and maintenance, and in-vehicle alerts and signage that displays and synthesizes messaging from a wide variety of traffic control devices (*e.g*. traffic signal controllers, roadside signs and other devices).[10] A current, but not exclusive, list of DSRC-enabled V2V and V21 safety applications that have been developed utilizing DSRC, includes:[11]

- Blind Spot Warning (BSW) –V2V
- Forward Collision Warning (FCW) – V2V
- Emergency electronic brake lights (EEBL) V2V
- Do not pass warnings (DNPW) – V2V
- Intersection Movement Assistance (IMA) – V2V
- Lane Change Warning (LCW) –V2V
- Control Loss Warning (CLW) – V2V

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[9] The types of vehicle information that is collected and transmitted include: latitude, longitude, time, heading angle, speed, lateral acceleration, longitudinal acceleration, yaw rate, throttle position, brake status, steering angle, headlight status, wiper status, external temperature, turn signal status, vehicle length, vehicle width, vehicle mass, and bumper height.

[10] Manual on Uniform Traffic Control Devices 2009 (MUTCD) (Revisions 1 and 2 May 2012): “Traffic control devices shall be defined as all signs, signals, markings, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, bikeway, or private road open to public travel by authority of a public agency or official having jurisdiction, or, in the case of a private road, by authority of the private owner or private official having jurisdiction.” Uniform application of traffic control devices are envisioned by the MUTCD to greatly improve the traffic operations efficiency and roadway safety.

[11] *See* Safer Driver Fact Sheet; Crash Avoidance Metrics Partnership (CAMP) Vehicle Communications Safety 2 VSC-A Applications_NHTSA - CAMP Comparison v2” document, US DOT (May 2, 2007).

- Approaching emergency vehicle warning
- Vehicle safety inspection
- Transit or emergency vehicle signal priority
- Electronic parking and toll payments
- Commercial vehicle clearance and safety inspections
- In-vehicle signing
- Traffic and travel condition data to improve traveler information and maintenance services

Eight original vehicle OEMs are working closely with US DOT to develop V2V applications.[12]

This five-year effort addresses eight specific crash scenarios:

- Lead Vehicle Stopped (rear end crash);
- Control Loss without Prior Vehicle Action;
- Vehicle(s) Turning at Non-Signalized Junctions;
- Straight Crossing Paths at Non-Signalized Junctions;
- Lead Vehicle Decelerating;
- Vehicle(s) Not Making a Maneuver Opposite Direction (head-on crash);
- Vehicle(s) Changing Lanes – Same Direction; and
- Left Turn Across Path/Opposite Direction (LTAP/OD) at Non-Signalized Junctions.

This research effort has already developed other DSRC applications to address common traffic control tasks, such as signal priority and common transaction-based highway services, such electronic tolling and freight carrier safety credentialing. Future research efforts contemplate examining ad-hoc public safety information services localized to specific road operations, including emergency vehicle presence, work zone notification, collision incident notification, and other critical traffic information for road users. Other future safety applications will likely be developed to support a wider variety of vehicle-vehicle crash types, single vehicle crash types, and crash types involving vulnerable road users such as motorcyclists, cyclists and pedestrians.

B. Avoided Costs From Reducing Crashes

[12] These eight original vehicle OEMs are providing support to US DOT through partnering agreements: Ford Motor Company, General Motors LLC, Honda R&D Americas, Inc., Hyundai-Kia America Technical Center, Inc., Mercedes-Benz Research and Development North America, Inc., Nissan Technical Center North America, Toyota Motor Engineering & Manufacturing North America, Inc. and Volkswagen Group of America, Inc.

According to NHTSA, in 2012, there were over 34,000 fatalities from road crashes in the United States, an increase of 5.3 percent over 2011.[13] Motor vehicle crashes are the leading cause of death for children and young adults (ages 5-29).[14] In 2009, more than 2.3 million adult drivers and passengers were treated in hospital emergency rooms in the United States.[15] It is estimated that traffic crashes as a proportion of gross national product ("GNP") for the United States equal approximately 2.0 to 2.3 percent of GNP.[16] Further research indicates that total medical and lost wages lost due to motor vehicle crashes, in 2005, was approximately $100 billion.[17] The American Automobile Association ("AAA") estimated, in 2011, that the annual societal costs to the United States from traffic crashes are $299.5 billion.[18] Based on a review of available academic research, US DOT in 2008 updated its determination of the best present value estimate of the economic value of preventing a human fatality is $5.8 million.[19]

This list of figures is intended to demonstrate that, in addition to the very real emotional consequences to the families of those killed and injured in motor vehicle crashes, they also have

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[13] Strickland Testimony at 1.

[14] Centers for Disease Control and Prevention, "Injury Prevention & Control: Motor Vehicle Safety," http://www.cdc.gov/Motorvehiclesafety/index.html (viewed May 20, 2013).

[15] *Id*.

[16] Rebecca B. Naumann, et al., "Incidence and Total Lifetime Costs of Motor Vehicle-Related Fatal and Nonfatal Injury by Road User Type, United States, 2005," Traffic Injury Prevention, 11:353-360, at 354 (2010).

[17] *Id*. at 355.

[18] AAA, "Crashes vs. Congestion: What's the Cost to Society?", Es-2 (2011) (viewed May 20, 2013 at http://newsroom.aaa.com/2011/11/aaa-study-finds-costs-associated-with-traffic-crashes-are-more-than-three-times-greater-than-congestion-costs/) ("AAA Study").

[19] U.S. Department of Transportation, Office of the Secretary of Transportation, Memorandum, "Treatment of the Economic Value of a Statistical Life in Departmental Analyses" (February 5, 2008). This figure is to be used in Departmental regulatory and investment analyses.

a significant economic impact on society as a whole from the associated medical costs, lost household production (non-market activities occurring in the home), medical costs, emergency services, travel delay, vocational rehabilitation, workplace costs, administrative costs, legal costs, and pain and lost quality of life; and property damage.[20] As noted above, NHTSA estimates that Connected Vehicle technology has the potential to address some 80 percent of crashes involving non-impaired drivers. Even if this figure is overly optimistic, the tremendous benefits to society in lives saved and injuries avoided, and the associated economic costs not incurred, from the Connected Vehicle program and DSRC should not be discounted.

C. Economic Benefits

The economic benefits to the US economy from (ITS, including benefits associated with DSRC-enabled applications and services, are significant. In August 2011, ITS America released a market study to estimate the contribution and impact of ITS on the US and North American economies. The study, "Sizing the U.S. and North American Intelligent Transportation Systems Market: Market Data Analysis of ITS Revenues and Employment,"[21] sponsored by US DOT, estimates that, in 2011, the ITS industry in the United States generated $48 billion in revenue for the US economy.[22] Globally, driver assistance system revenues totaled $23 billion in 2012 and

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[20] AAA Study at 1.

[21] Intelligent Transportation Society of America, "Sizing the U.S. and North American Intelligent Transportation Systems Market: Market Data Analysis of ITS Revenues and Employment" (August 2011) (accessible at http://www.itsa.org/knowledgecenter/market-data-analysis) ("ITS Market Study").

[22] *Id*. Note, however, that the ITS Market Study does not provide breakout figures for Connected Vehicle/DSRC equipment, applications and services. One of the ITS market sectors identified in the ITS Market Study is the "Vehicle Safety Market Sector," which included DSRC-related Connected Vehicle technologies: automated vehicle systems, cooperative vehicle safety systems, vehicle safety monitoring and assistance systems, and collision notification systems.

are expected to grow to $480 billion by 2020.[23] Moreover, the ITS Market Study estimates that ITS-related private sector employment numbered 180,000, with 445,000 total US jobs in the ITS value and 6400 jobs expected to be annually through 2015. These jobs are also well paying, averaging more than 75 percent above the national average. Three occupations – software developer, hardware developer, and engineering – make up over 30 percent of all ITS jobs.

D. DSRC Procedural History

DSRC systems have been successfully deployed elsewhere in the world, and an ITS allocation in the 5.9 GHz would be consistent with the ITU Table of Allocations for Region 2. In October 1999, the Commission allocated 75 MHz in the 5.9 GHz Band for ITS applications and adopted basic technical rules for DSRC, deferring the adoption of licensing and service rules until a later proceeding.[24] The Commission concluded: "The record in this proceeding overwhelmingly supports the allocation of spectrum for DSRC-based ITS applications to increase traveler safety, reduce fuel consumption and pollution, and continue to advance the nation's economy. ... [W]e find that the 5.850-5.925 GHz band can accommodate a wide variety of reliable DSRC applications without significantly hindering other users of this spectrum."[25] Accordingly, the Commission adopted footnote NG160 in its Table of Allocations to reflect the spectrum allocation.[26]

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[23] *See* http://www.abiresearch.com/press/global-driver-assistance-systems-revenues-to-reach.

[24] *See Amendment of Part 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, Report and Order, ET Docket No. 98-95, RM 9096, FCC 99-305, 14 FCC Rcd 18221 (1999) ("*Allocation R&O*").

[25] *Id.* at ¶1.5.

[26] NG160 reads: "In the 5850-5925 MHz band, the use of non-Federal government mobile service is limited to Dedicated Short Range Communications in the Intelligent Transportation radio service."

In December 2003, the Commission issued a *Report and Order* adopting service rules for the 5.9 GHz Band.[27] The most significant rules include:

- Designation of a single transmission standard for DSRC devices ("ASTM DSRC Standard");[28]
- Shared access to the full 75 MHz by all licensees, both public safety and non-public safety licensees;
- Non-exclusive, geographic-area licensing based on the applicant's area of operations.
- A channel plan encompassing 70 MHz (10 MHz per channel), with seven service channels and a control channel in the center of the band;
- Message priority framework with first-to-last: safety of life, public safety, non-public safety;
- Licensees to register Roadside Units by site location; and
- Vehicle On-Board Units do not require an individual license but are instead licensed "by rule."

In 2006, the Commission issued a *Memorandum Opinion and Order* making the following changes to the DSRC rules:[29]

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[27] *See Amendment of the Commission's Rules Regarding Dedicated Short-Range Communication Services in the 5.580-5.925 GHz Band (5.9 GHz Band)*, WT Docket No. 01-90, *Amendment of Part 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, RM-9006, Report and Order, FCC 03-324, 19 FCC Rcd 2458 (2004) ("*DSRC Rules R&O*").

[28] E 2213-3 Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems – 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications ("ASTM DSRC Standard").

[29] *Amendment of the Commission's Rules Regarding Dedicated Short-Range Communication Services in the 5.580-5.925 GHz Band (5.9 GHz Band)*, WT Docket No. 01-90, *Amendment of Part 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, RM-9096, Memorandum Opinion and Order, 21 FCC Rcd 8961, FCC 06-110, ¶ 1 (2006) ("*DSRC MO&O*").

- Designated Channel 172 (at 5855-5865 MHz) exclusively for V2V application for accident avoidance and mitigation and safety of life and property applications;
- Designated Channel 184 (at 5915-5925 MHz) exclusively for high-power, longer-distance communications to be used by public safety involving safety of life and property, and including road intersection collision mitigation;
- Required licensees to file a notice of construction for each registered site;
- Clarified that site priority attaches to prior registered sites that have been constructed within the required 12-month construction period; and
- Increased the authorized transmitting power for Roadside Unit antennas below a certain height.

E. DSRC DEVELOPMENT AND DEPLOYMENT

i. Federal ITS Program

The federal ITS program dates back over 20 years. Created in 1991's Intermodal Surface Transportation Efficiency Act ("ISTEA");[30] the federal ITS program – then called "Intelligent Vehicle-Highway Systems" – started with a focus on implementing advanced technologies to enhance the capacity, efficiency and safety of the Federal-aid highway system.[31] Of the amounts made available in the federal-aid funding since 1991, US DOT estimates it has invested more than $450 million in direct DSRC research, development, testing and deployment activities over the life of the federal ITS program.

ISTEA provided approximately $156 million in federal funding for research and development over six years (FY 1993 through FY 1997). ISTEA was followed in 1998 by the Transportation Equity Act for the 21st Century ("TEA-21").[32] TEA 21 specifically called for increasing the safety of motor vehicles, particularly decreasing the number and severity of collisions. The legislation provided funding both for research, standards development and

[30] 105 Stat. 1914, Pub. L. 102-240 (1991). ISTEA also led to the creation of ITS America that same year.

[31] *Id*. at § 6052.

[32] 112 Stat. 107, Pub. L. 105-178.

testing ($603 million) and for ITS deployment projects ($679 million) over 6 years (FY 1998 through 2003).[33] In addition, in TEA 21 Congress directed the Commission to consider the spectrum needs for ITS and DSRC, writing:

> The Federal Communications Commission shall consider, in consultation with the Secretary [of US DOT], spectrum needs for the operation of intelligent transportation systems, including for the dedicated-short-range-vehicle-to-wayside wireless standard. Not later than January 1, 1999, the Federal Communications Commission shall have completed a rulemaking considering the allocation of spectrum for intelligent transportation systems."[34]

This Congressional language led to the Commission's 1999 allocation of the 5.9 GHz Band for DSRC.

The next highway reauthorization bill, 2005's Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users ("SAFETEA-LU),[35]continued the funding split for ITS research activities and deployment activities for the next five years (FY 2005 through FY 2009): $550 million for ITS research; $122 million for ITS deployment. SAFETEA-LU, moreover, directed US DOT to "facilitate," in conjunction with the motor vehicle industry, the introduction of "vehicle-based safety enhancing systems."[36] SAFETEA-LU was extended several times, covering FY 2010 through FY 2012, at the funding levels of the last fiscal year of the legislation: an additional $366 million ($122 million in each FY 2010 through FY 2012).

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[33] TEA 21 was extended for an additional fiscal year, FY 2004: $110 million for research activities and $122 million for deployment activities.

[34] *Id.* at § 5206(f).

[35] 119 Stat. 1144, Pub. L. 109-59 (2005).

[36] *Id*. at § 5303.

The current highway reauthorization, 2012's Moving Ahead for Progress in the 21st Century ("MAP-21")[37] provides an additional $200 million in funding for FY 2012 and FY 2013. In MAP-21, Congress directs US DOT to carry out operational tests involving "intelligent vehicles" and "intelligent infrastructure,"[38] and prioritize efforts to "enhance vehicle safety through improved crash avoidance and protection, crash and other notifications, … and infrastructure-based or cooperative safety systems … and facilitate the integration of intelligent infrastructure, vehicle, and control technologies."[39] In addition, Congress directs US DOT to provide a report in 2015 assessing the state of DSRC and identifying a path for realizing implementation of DSRC applications and services.[40]

ii. Key Federal DSRC Activities

Since the Commission's 1999 allocation of the 5.9 GHz Band, there has been steady and significant progress toward the deployment of DSRC technology and applications, and to establish the appropriate foundation for nationwide deployment. Both the governmental and private sectors have contributed many millions of dollars and thousands of man-hours in such activities as standards development, prototype equipment development, laboratory and field testing, and demonstrations. These efforts are continuing, and DSRC is entering a critical period that could decide whether nationwide deployment will become a reality.

As further described below, key federal DSRC program activities and funding support have included: basic research; establishment of a test bed to conduct "proof of concept" testing;

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[37] 126 Stat. 405, Pub. L. 112-141 (2012).

[38] *Id*. at § 53004.

[39] Id.

[40] *Id*. at § 53006.

standards development and harmonization; establishment of six independent DSRC test beds. The latest testing conducted includes the current Connected Vehicle "Safety Pilot" model deployment conducted by the University of Michigan's Transportation Research Institute. The information collected from the Safety Pilot, along with the results of other key research projects being conducted as part of the Connected Vehicle research program, will be used by NHTSA to determine by 2013 whether to proceed with additional V2V safety research and development activities, including possible future rulemakings. .

iii. State DSRC Activities

Other research activities include efforts of State DOTs and other road authorities' efforts. As the operators of highways, secondary and local roads, the interest of State DOTs and local transportation authorities is more focused on infrastructure applications for Connected Vehicles, both safety and mobility applications using DSRC. According to the American Association of State Highway and Transportation Officials ("AASHTO"), State DOTs are conducting Connected Vehicle activities associated with infrastructure-based systems involving traveler information, commercial vehicle systems, fleet vehicle programs, incident management, emergency vehicle integration, payment systems (mileage based user fee) and intersection safety.[41] Specific activities are in the testing, pilot, research, demonstration or planning phases.[42]

iv. Private Sector Involvement

Much research has been conducted by the automobile industry. Eight original vehicle OEMs (Ford, General Motors, Honda, Hyundai-Kia, Mercedes-Benz, Nissan, Toyota and

[41] AASHTO Connected Vehicle Infrastructure Deployment Analysis, Final Report, Publication Number: FHWA-JPO-11-90, 20-21 (June 17, 2011) (accessible at www.its.dot.gov/index.htm) ("AASHTO Report").

[42] *Id*. at 20.

Volkswagen) have entered into partnering agreements with US DOT to support the Connected Vehicle research program. Also participating are two vehicle OEM consortia: Vehicle Infrastructure Integration Consortium ("VIIC")[43] and Crash Avoidance Metrics Partnership ("CAMP").[44] Other participants include vehicle Tier-1 suppliers, radio equipment manufacturers, system integrators, technical and management consultants, industry and professional associations, and standards-setting organizations, as well as other non-governmental participants: industry trade associations, professional membership associations, standards-setting organizations, academic research institutions and US national laboratories. US DOT's Connected Vehicle research program is a true public-private partnership.

v. Licensing

Currently, 42 entities hold DSRC licenses from the Commission. Licensees include state DOTs; local governments (counties, cities, towns); transit, thruway, bridge, tunnel and port authorities; commercial DSRC service providers, research and testing organizations, and others.

vi. Equipment Development

In support of the on-going Connected Vehicle Safety Pilot Model Deployment, discussed below, in October 2010 US DOT provided grants to eight entities to develop prototype DSRC radio devices. The devices were to be capable of generating and transmitting "Here I Am" basic safety messages to other vehicles and devices using DSRC. IN 2011, US DOT provided grants to three vendors to develop DSRC-based, "After Market Safety Devices," which are capable of supporting V2V applications. Then, in 2012, US DOT invited four companies to provide DSRC

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[43] VIIC is a consortium of nine car and light truck manufacturers whose mission is to identify requirements for and represent the automotive industry regarding the national deployment of 5.9 GHz DSRC systems for cooperative safety and other applications.

[44] CAMP is a partnership of original vehicle OEMs created to accelerate the implementation of crash avoidance countermeasures to improve traffic safety.

roadside units. US DOT further advised that those entities whose devices pass the certification testing process would be placed on a "Qualified Product List" and, accordingly, be eligible for use in the Model Deployment. Subsequently, US DOT selected four companies to provide DSRC roadside equipment for the Model Deployment.

Tier-1 vendors like Delphi, Denso, and Visteon have invested millions of R&D dollars to develop DSRC-based "Advanced Driver Assistance ("ADAS") technology. ITS companies such as DGE, Kapsch TrafficCom, and Siemens have spent millions of dollars to develop wireless based R&D ADAS. Moreover, startup companies like Autotalks, Kapsch TrafficCom, and Savari have spent almost a decade of R&D and raised millions of dollars to develop and deploy DSRC-based technology.

UMTRI, which is leading the Model Deployment Safety Pilot in Michigan, has invited Cohda/Savari to provide "Vehicle Awareness Devices." Cohda/Denso/Kapsch will provide "Aftermarket Safety Devices"; Savari will provide the roadside units. All the qualified DSRC equipment vendors have either certified or are in the process of procuring the necessary FCC certification for the purposes of commercial deployments.

F. Standards Development and Harmonization

The development of technical standards is a core activity for the Connected Vehicle research program and DSRC – and for the federal ITS program generally. Standards are critical to facilitate interoperability between and among ITS devices and components for the exchange and interpretation of data through a common communications interface.[45] As noted above, the

[45] See US Department of Transportation, Research and Innovative Technology Program, Intelligent Transportation Systems Joint Program Office, ITS Standards Program: "About ITS Standards" (accessible at http://www.standards.its.dot.gov/LearnAboutStandards/ITSStandardsBackground) (viewed May 23, 2013).

Commission adopted into its rules for DSRC the ASTM DSRC standard.[46] In adopting the standard, the Commission acknowledged the need for and benefits associated with interoperability for DSRC. The Commission wrote: "Without interoperability standard that enables that enables units to communicate with one another regardless of location, equipment used, or the licensee, the overall effectiveness of DSRC operations would be drastically reduced."[47] The ASTM DSRC Standard is used for medium access control ("MAC") and physical layer application ("PHY") for the wireless connectivity using DSRC. It also specifies the transmitter and receiver specifications for both DSRC onboard units and roadside units. The 5.9 GHz DSRC channel plan is also found in the standard.

There has been considerable additional work on the ASTM DSRC Standard since the Commission's adoption into the DSRC rules in 2003. As the ASTM DSRC Standard is based on 802.11a protocols, future developments were moved to IEEE, the standards-setting home for 802.11. In 2010, 802.11p was approved as an amendment to the IEEE 802.11 for wireless local area networks ("WLANs") providing wireless communications while in a vehicular environment.[48] Subsequently, in 2012, 802.11p was incorporated into the general 802.11 WLAN standard.[49]

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[46] *Supra* n. XX.

[47] *DSRC Rules R&O* at ¶ 14.

[48] 802.11 p - IEEE Standard for Information technology-- Local and metropolitan area networks-- Specific requirements-- Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 6: Wireless Access in Vehicular Environments

[49] 802.11 – 2012™: IEEE Standard for Information Technology –Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications

In addition, there has been concurrent work on the IEEE 1609 family of five standards. IEEE 1609 seeks to define homogeneous interferences to enable, in particular, secure V2V and V2I wireless communications.[50] The most IEEE 1609 standard, adopted in 2013, defines secure message formats and processing.[51] IEEE 1609 applies to the upper layer protocols for DSRC communications.

Yet another standard defines the DSRC message set. SAE J2735 is the source for the DSRC Message Set Dictionary, which sets forth the standard message sets, data frames and data elements for use by DSRC applications, both V2V and V2I.[52] The standard defines message formats for an a la carte message, basic safety message, emergency vehicle alert message, a probe vehicle data message, traveler advisory message, weather condition message, road condition message, and others. The basic safety message, for example contains vehicle safety-related information that is periodically broadcast to surrounding vehicles.[53]There are on-going efforts to harmonize these standards in international arenas, particularly with Western Europe and Japan.

G. Testing

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[50] *See generally* US Department of Transportation, Research and Innovative Technology Program, Intelligent Transportation Systems Joint Program Office, ITS Standards Program: "Deployment Resources: ITS Standards Fact Sheets" #80 (accessible at http://www.standards.its.dot.gov/Factsheets/Factsheet/80 (viewed May 23, 2013).

[51] IEEE Std 1609.2 – 2013 - Standard for Wireless Access in Vehicular Environments (WAVE) – Security Services for Applications and Management Messages.

[52] *See generally* US Department of Transportation, Research and Innovative Technology Program, Intelligent Transportation Systems Joint Program Office, ITS Standards Program: "Deployment Resources: ITS Standards Fact Sheets" #71 (http://www.standards.its.dot.gov/Factsheets/Factsheet/71) (viewed May 23, 2013).

[53] *Id*.

To support testing efforts of DSRC radio equipment, US DOT has implemented a national Connected Vehicle Test Bed effort to make available multiple testing locations to assess how Connected Vehicle technologies perform under real-world operating conditions.[54] The program mission is to provide facilities where developers and users can test new hardware and software to support the advancement of Connected Vehicle technology, including V2V and V2I wireless communications utilizing DSRC. There is no cost to the developer or user to utilize the Test Bed.

The first Test Bed is located in Novi, Michigan in 2010, and is specifically designed to support DSRC testing in the 5.9 GHz Band. The Michigan Test Bed covers 45 square miles, comprising 75 center-line miles consisting of 32 interstate and divided highway and 43 arterial miles, and covering signalized and unsignalized intersections. In addition, there are 50 DSRC roadside units installed along the Test Bed network.

Since the naming of the first Test Bed in Michigan, US DOT has expended the network to five additional Test Beds: Palo Alto, CA; Oak Ridge, TN; Orlando, FL; Turner-Fairbank Highway Research Center/Federal Highway Administration, McLean, VA; and New York City, NY. US DOT is actively soliciting applicants seeking to establish additional Connected Vehicle Test Beds. Several of the State DOTs, such as like Arizona DOT (in collaboration with University of Arizona) and Virginia DOT (in collaboration with Virginia Tech) have established Test Beds in Anthem, AZ and Blacksburg, VA, respectively, to support various Connected Vehicle applications that are of great concern to these states.

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[54] *See generally* U.S. Department of Transportation, Research and Innovative Technology Administration, Connected Vehicle Test Bed Brochure: Testing Connected Vehicle Technologies in a Real-World Environment (accessible at http://www.its.dot.gov/testbed.htm) (viewed May 21, 2013).

In 2008 and 2009, US DOT sponsored "proof of concept" testing for V2V and V2I communications using DSRC. This testing, conducted at the Michigan Test Bed, involved an effort to specify, design, and build a small-scale "instantiation" of a conceptual system for future national deployment of V2V and V2I systems.[55] This testing was designed to verify mechanisms for wirelessly sending and receiving roadway information to and from vehicles, and between vehicles, regarding the following criteria: safety, mobility, private services, security, maintainability, and privacy. Participants in the "proof of concept" testing under a cooperative agreement with US DOT included the VIIC Consortium, AASHTO, suppliers of prototype DSRC radio equipment and technical and program consultants.

Separately, an industry-based technical association, OmniAir Consortium ("OmniAir") has developed testing procedures and criteria for certifying DSRC radio devices as compliant with the relevant standards, including IEEE 802.11p and IEEE 1609.[56] OmniAir serves as an independent, third-party certifier of DSRC radio devices so that users of this equipment can be confident that they will be reliable, secure and "interoperable" regardless of location and user.

H. Demonstrations and Safety Pilot Program: Driver Acceptance Clinics and Model Deployment

US DOT's Connected Vehicle program, in conjunction with its partners, is conducting a Safety Pilot Program to examine connected vehicle technologies and real-world applications. This effort is intended to enable US DOT to gather supporting information it needs to decide if connected vehicle technologies are mature and effective to continue with this research and

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[55] *See* Final Report: Vehicle Infrastructure Integration Proof of Concept Executive Summary – Vehicle (May 19, 2009) (available at http://www.its.dot.gov/vii/). Additional reports on other aspects of the proof of concept testing are also available at this same webpage.

[56] *See generally* www.omniair.org.

consider possible regulatory actions.[57] The Safety Pilot Program is divided into two phases: Phase One – Driver Acceptance Clinics; and Phase 2 – Model Deployment.

Phase One – Driver Acceptance Clinics. Starting in August 2011 and continuing through January 2012, US DOT and its research partners conducted a series of six "driver clinics" to assess driver acceptance of V2V safety systems and using DSRC. Specifically, the driver clinics had three objectives:[58]

- Obtain feedback on connected vehicle technology and safety applications from a representative sample of drivers;
- Assess the performance and reliability of 5.9 GHz DSRC communications and GPS in diverse geographic locations and environmental conditions; and
- Promote V2V-safety technology and potential safety benefits.

16 vehicles from the OEM partners were equipped with six different V2V safety systems: forward collision warning, emergency electronic brake lights, blind spot warning/lane change warning, left turn assist, intersection movement assist and do not pass warning. Over 700 persons were able to experience these safety systems in scenarios run by professional drivers as well as by driving some of the vehicles themselves. US DOT reports that there was overwhelming support (9 out of 10) from participants who indicated that they would like to have these safety applications in their vehicles and believe the technology would be useful in improving vehicle safety.[59]

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[57] *See* U.S. Department of Transportation, Safety Pilot Connected Vehicle Technology, Fact Sheet: "Improving Safety and Mobility Through Connected Vehicle Technology" (2012) (available at http://icsw.nhtsa.gov/safercar/ConnectedVehicles/pages/resources.html) ("Safety Pilot Fact Sheet")

[58] *See* M. Lukuc, National Highway Traffic Safety Administration, U.S. Department of Transportation, Light Vehicle Driver Acceptance Clinics, Preliminary Results (May 21, 2012) (available at http://icsw.nhtsa.gov/safercar/ConnectedVehicles/pages/resources.html).

[59] Safety Pilot Fact Sheet at 3.

Phase Two – Model Deployment. Starting in August 2012 in Ann Arbor, Michigan, with support from US DOT, the University of Michigan's Transportation Research Institute ("UMTRI") is leading a 30-month safety model deployment pilot program of V2V and V2I safety applications.[60] The Model Deployment is designed to determine the effectiveness of these applications to reduce vehicle crashes and to learn how real-world drivers respond to these devices and applications in their vehicles. The testing phase will occur over 12 months and involves almost 3000 private, commercial and fleet vehicles (cars, trucks and buses) across 75 miles of local roads instrumented with roadside transmitters. The vehicles have been outfitted with a mix of DSRC communications devices: vehicle awareness devices,[61] retrofitted safety devices,[62] and integrated safety systems[63] or aftermarket safety devices, all of which enable wireless communications between vehicles and the roadside infrastructure. All the communications devices transmit a "basic safety message" 10 times per second that other

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[60] *See generally* RITA, Intelligent Transportation Systems Joint Program Office, Fact Sheet: "Connected Vehicle Safety Pilot Program" (viewable at http://www.its.dot.gov/factsheets/pdf/SafetyPilot_final.pdf); University of Michigan Transportation Research Institution, "Safety Pilot Model Deployment" (viewed on May 21, 2013 at http://www.umtri.umich.edu/divisionPage.php?pageID=505).

[61] A "vehicle awareness device" is an aftermarket electronic device installed in a vehicle without connection to vehicle systems. This device does not generate warnings, but transmits only a vehicle's speed and location. U.S. Department of Transportation, Safety Pilot Connected Vehicle Technology, Questions & Answers About DOT's Safety Pilot "Model Deployment," 2 (2012) (available at http://icsw.nhtsa.gov/safercar/ConnectedVehicles/pages/resources.html) ("Model Deployment Questions & Answers").

[62] A "retrofit safety device" is an electronic device installed in a truck or bus by an authorized service provider after the vehicle has completed the manufacturing process. The device is integrated into the vehicle bus and in-vehicle sensors. *Id.*

[63] "Integrated safety systems" are electronic devices during vehicle production and are connected to the vehicle bus and in-vehicle sensors. Available for both light vehicles and trucks. *Id.*

vehicles use, along with the vehicle's own data, to determine whether a potential traffic hazard exits.[64] Four safety applications are being studied:[65]

- Forward Collision Warning – Warns the driver if he/she fails to brake when a vehicle in the driver's path is stopped or traveling slower and there is a potential risk of collision.
- Lane Change Warning/Blind Spot Warning – Warns the driver when he/she tries to change lanes if there is a car in the blind spot or an overtaking vehicle.
- Emergency Electronic Brake Light Warning – Notifies the driver if there is a vehicle ahead (or several vehicles ahead), including those that the driver may not be able to see, but is braking hard.
- Intersection Movement Assist – Warns the driver when it is not safe to enter an intersection, such as when something is blocking the driver's view of opposing or crossing traffic.

Overall, the Model Deployment's research goals are:

- Demonstrate connected vehicle technologies in a real-world, multi-modal environment;
- Determine driver acceptance of vehicle-based safety systems;
- Evaluate feasibility, scalability, security, and interoperability of DSRC technology; and
- Assess options to accelerate safety benefits.[66]

As was the case for the driver clinics, data collected from the Model Deployment will be used by NHTSA to determine whether to continue with V2V safety research and a possible regulatory decision in 2013.

I. NHTSA's 2013 Regulatory Decision

The collected data and results from the Connected Vehicle research program, and especially the two phases of the on-going Safety Pilot Program, will be used by NHTSA to assess how connected vehicle and DSRC technology can improve safety and mobility, and

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[64] Safety Pilot Fact Sheet at 4.

[65] Model Deployment Questions & Answers at 2.

[66] University of Michigan Transportation Research Institute, Brochure: "Safety Pilot Model Deployment" (viewable at http://www.umtri.umich.edu/content/SafetyPilot_brochure_v3.pdf).

whether they can be effectively deployed under real-world conditions.[67] These efforts also lead up to an anticipated regulatory decision in late 2013 (for light vehicles) and late 2014 (for trucks) regarding the future of connected vehicle technology. Pursuant to its authority to promulgate and enforce Federal Motor Vehicle Safety Standards, NHTSA's decision could take several possible forms, including mandatory deployment of connected vehicle technology in vehicles, recommend voluntary installation of wireless radio devices in vehicles, or call for additional research and development prior to any regulatory decision.

Concurrent with NHTSA's analysis and decision-making on Connected Vehicles, US DOT is also developing its plans for nationwide deployment of DSRC roadside infrastructure. In accordance with the Congressional directives in MAP-21,in 2015, US DOT is scheduled to: (1) complete identification of all requirements for DSRC infrastructure deployment (standards, technical, policy, etc.); and (2) report to Congress on nationwide DSRC implementation plans.[68]

J. Near-Term Deployments

Connected Vehicle deployments are already taking place. Several states, including in Minnesota, California, Idaho, New York, Arizona, Washington State, Michigan, and Virginia, are implementing or planning Connected Vehicle projects using DSRC: in-vehicle signage, stop-sign assist, signal prioritization at intersections, commercial vehicle administration and credentialing, collection and dissemination of "probe" data for real-time weather and traffic

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[67] See National Highway Traffic Safety Administration, Vehicle to Vehicle Communications for Safety, available at http://icsw.nhtsa.gov/safercar/ConnectedVehicles/pages/v2v.html (viewed May 21, 2013).

[68] U.S. Department of Transportation, Notice of *Ex Parte* Presentation, WT Docket No. 01-90 and ET Docket No. 98-95, attached slide deck at 3 (July 30, 2012) ("July 2012 US DOT *Ex Parte* Presentation").

conditions, among others.[69] Starting in 2009, Virginia DOT has been leading a cooperative effort of several state DOTs, select counties, local transportation authorities and universities to conduct planning and evaluation of possible large-scale deployments of Connected Vehicle applications that can assist efforts for managing transportation systems.[70] Maricopa County DOT in collaboration with University of Arizona and Savari, has created a SMARTDrive prototype near Phoenix, AZ, which is a state-of-the-art field lab for testing new transportation technologies.[71]

Private sector entities also are moving ahead with Connected Vehicle/DSRC deployments. Kapsch TrafficCom, a developer of DSRC radio devices, is partnering with Help Inc., a public-private partnership that provides automatic commercial vehicle credentialing, in a pilot deployment in Indiana, Ohio and Illinois to use DSRC at commercial vehicle inspection stations.[72] Transcore has been selected by San Francisco airport to provide the support for ground transportation & commercial taxi management system using DSRC.

K. Middle Class Tax Relief and Job Creation Act of 2012

i. Band-Sharing Study

On February 22, 2012, President Obama signed into law the Middle Class Tax Relief and Job Creation Act of 2012 ("Tax Relief Act").[73] Despite its name, the Act included multiple

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[69] *See* AASHTO Report at 21-22.

[70] *Id.* at 22.

[71] National spotlight on Maricopa County Test Site for High Tech Traffic Management http://www.mcdot.maricopa.gov/news/2012/smartdrive-demonstration.htm

[72] *See* Kapsch TrafficCom, Brochure: "e-Screening Pilot Corridor Powered by 5.9 GHz," attached hereto.

[73] Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96 (signed Feb. 22, 2012) ("Tax Relief Act").

significant provisions affecting spectrum, including for DSRC. Section 6406 of the Tax Relief Act directs the National Telecommunications and Information Agency ("NTIA") to conduct spectrum sharing studies regarding the 5350-5470 MHz band ("5.4 GHz Band") and the 5.9 GHz band -- "evaluating known and proposed spectrum-sharing technologies" and the potential risk to "Federal users" if unlicensed "U-NII devices" are permitted to operate in these two bands, particularly unlicensed wireless broadband services.[74] Section 6406 further specifies that NTIA is to provide its report to Congress regarding the spectrum sharing study for the 5.4 GHz band not later than eight months after enactment of the Act (October 2012), and its report on the 5.9 GHz band sharing study not later than 18 months after enactment (August 2013).[75]

Subsequently, on January 25, 2013, NTIA released its Congressionally-directed report in which it consolidated the studies of each of the 5.4 GHz Band and 5.9 GHz Band: "Evaluation of the 5350-5470 MHz and 5850-5925 MHz Bands Pursuant to Section 6406(b) of the Middle Class Tax Relief Act of 2012."[76] The NTIA Spectrum Study evaluates the risks to DSRC associated with allowing unlicensed U-NII devices to operate in the 5.9 GHz Band.[77] NTIA identifies four (4) "risk factors" to DSRC from unlicensed U-NII devices:[78]

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[74] *Id.* at § 6406(b).

[75] *Id.*

[76] US Department of Commerce, National Telecommunications and Information Administration, "Evaluation of the 5350-5470 MHz and 5850-5925 MHz Bands Pursuant to Section 6406(b) of the Middle Class Tax Relief Act of 2012" (released Jan. 25, 2013) ("NTIA Report").

[77] Regarding its consideration of DSRC, the NTIA wrote: "For the purpose of this study, NTIA treats DSRCS systems like a federal system in assessing the feasibility of allowing U-NII devices to operate in the 5850-5925 MHz band." *Id.* at 5-2. ITS America agrees with NTIA's approach given the significant public safety benefits to be gained from the successful implementation of DSRC services and applications.

[78] *Id.* at 5-10 to 5-12.

- Risk Element 1: Existing U-NII regulations were not developed to detect DSRC signals;
- Risk Element 2: U-NII signal detection technologies may not be capable of detecting DSRC signals;[79]
- Risk Element 3: Current U-NII regulations were not developed to protect non-co-located transmitters and receivers; and
- Risk Elements 4: Changes to U-NII DFS detection parameters may not protect DSRC systems from serious performance degradation.

The NTIA Report discusses possible mitigation techniques associated with each of the identified risk elements; however, NTIA notes that the potential introduction of U-NII devices in the 5.9 GHz Band presents "significant technical challenges."[80] Accordingly, NTIA proposes a comprehensive and robust "quantitative evaluation" to determine the feasibility of introducing U-NII devices into the 5.4 GHz and 5.9 GHz Bands. In Table 6-2 of the Report, NTIA details a tentative two-year schedule – from January 2013 through December 2014 -- and identification of milestones for the proposed quantitative evaluation.[81] NTIA anticipates conducting this analysis in collaboration with the Commission, industry and federal stakeholders.[82] For DSRC, NTIA also identifies several specific activities that should be undertaken in the proposed quantitative evaluation:[83]

- Examine if the risks to DSRC systems can be addressed by extending the existing 5725-5825 MHz band U-NII regulations to the 5850-5925 MHz Band;

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[79] NTIA further suggests that its proposed evaluation consider four possible spectrum sharing techniques for U-NII devices to detect DSRC signals: energy detection, matched filter detection, signal detection, and geo-location detection. *Id.* at 5-10 to 5-11.

[80] *Id*. at 6-2.

[81] *Id*. at 6-4 (Table 6-2: Tentative Schedule and Milestones for Completing Quantitative Evaluation). NTIA further notes that this effort would enable "timely reporting" by the United States as part of the ITU-R broadband agenda item for the 2015 World Radio Congress. *Id*. at 6-3.

[82] *Id*. at 6-2.

[83] *Id*. at 5-13.

- Examine if additional technical constraints on U-NII devices operating in the 5850-5925 MHz band are necessary to protect DSRC systems.
- Examine whether using the RF physical layer of the 802.11ac standard would improve sharing between U-NII devices and DSRC systems.

ii. Commission Spectrum Sharing Rulemaking

In addition, the Tax Relief Act required the Commission to commence a rulemaking to allow unlicensed U-NII devices to operate in the 5.6 GHz band if the Commission finds that: (1) unlicensed users will be protected by technical solutions; and (2) the primary mission of Federal users will not be compromised by the introduction of unlicensed devices.[84] However, the Tax Relief Act did not similarly require the Commission to commence a rulemaking proposing sharing of the 5.9 GHz Band with unlicensed U-NII devices. In fact, the first publicly released draft of the spectrum reform legislation ultimately included in the Tax Relief Act, in July 2011 by Representatives Waxman (D-CA) and Eshoo (D-CA), called for the Commission to initiate a rulemaking to make available the 5.9 GHz Band along with the 5.4 GHz Band to U-NII devices.[85] However, that provision for the 5.9 GHz was ultimately dropped from the final version of the Tax Relief Act enacted in February 2012 but retained for the 5.4 GHz Band.

Within a month of the release of the NTIA Spectrum Study, the Commission released the *NPRM*[86] that is the subject of these Comments. Although Congress did not require in the Tax Relief Act that the Commission to commence a rulemaking for the 5.9 GHz Band, the Commission is nonetheless proposing to add a permitted use in the 5.9 GHz Band for unlicensed

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[84] Tax Relief Act at § 6406(a).

[85] U.S. House of Representatives, 112th Congress, H.R. 2520, Spectrum for Innovation Act, § 1(a)(1).

[86] *See supra* n. 1.

U-NII devices, [87] recognizing also that DSRC operations must be protected under its pre-existing primary status in the band.[88] Public comments are sought on this proposal. The Commission also seeks comments on the NTIA Report.[89]

III. THE COMMISSION MUST PROTECT THE PRIMARY DSRC SPECTRUM ALLOCATION

For over 20 years, this Commission has been a key partner in the public and private sector efforts to improve roadway safety and save lives on our highways. Its support has been steadfast in the deployment of life saving ITS systems and technologies. In 1989, the Commission granted a waiver of its Rules to permit the deployment of the first vehicle radar collision warning systems**.** The Commission promoted the deployment of electronic toll systems in the early 1990s, fostered the development of E-911 systems and technologies and assigned 511 nationally for traveler information systems**,** among other actions. In its 1999 Order, allocating the 75 MHz in the 5.9 GHz Band for DSRC, the Commission observed that "DSRC applications are a key element in meeting the nation's transportation needs into the next century and in improving the safety of our nation's highways. With this goal in mind, we agree with the DOT that it is important to provide sufficient spectrum to facilitate the development and growth of DSRC applications."[90]

The Commission's allocation of spectrum for the development and deployment of life saving DSRC technologies has provided the platform for the standards development work that followed, for the development and testing of prototype systems and the formulation of service

[87] *NPRM* at ¶¶ 14, 22.

[88] *Id.* at ¶ 101.

[89] *Id*. at ¶ 104.

[90] *Allocation R&O* at ¶ 1.9.

rules, including designation of Channels 172 and 184 for High Availability Low Latency, and Higher Power Public Safety, respectively. DSRC equipment has been certified and licenses issued for systems now operating in 20 states. DSRC safety applications, including intersection collision avoidance, blind-spot warning, lane change warning, forward collision warning, among others, have been successfully demonstrated at multiple industry events and conferences, including the 2011 ITS World Congress held in Orlando, Florida and the 2012 ITS America Annual Meeting held in Washington, D.C.[91] Collectively, public and private sector investment totaling in the billions of dollars have been made in the development of DSRC systems and technologies and many business plans now depend upon the availability and suitability of the DSRC spectrum.

The Commission's allocation of the 5.9 GHz band for the deployment of DSRC systems and technologies that can and will improve safety on the nation's roadways and save lives is well grounded in both fact and law and must not be disturbed now or disrupted by the introduction of uses incompatible with their safe operation and robust deployment. Since the release of the *NPRM*, however, many parties, including Savari, have expressed concerns regarding the potential adverse impact of the introduction of unlicensed devices into the 5.9 GHz band upon the suitability of the band for DSRC. DSRC technology has matured significantly and the Test Beds are demonstrating that DSRC will soon be ready for market deployment. Concerns about a potentially pre-mature decision or lingering regulatory uncertainty with respect to the integrity of the 5.9 GHz band could have a negative impact on a very promising emerging market for DSRC-based safety applications.

[91] A video produced by CAMP demonstrating V2V applications can be accessed at this US DOT webpage: http://www.its.dot.gov/library/media/7connectedvehicle.htm.

U-NII devices are considered "unlicensed" and, as such, their operations are subject to operating consistent with Part 15 of the Commission's Rules[92] rather than under a specific licensing regime (such as is the case for DSRC). The *NPRM* proposes to revise Part 15 to permit the operation of U-NII devices in additional spectrum at 5 GHz, including the 5.9 GHz Band.[93] As a co-primary allocation in the 5.9 GHz Band, Commission rules and precedents require that DSRC be protected from interference from secondary users. Even if the Commission were to ultimately determine that DSRC and U-NII devices could successfully share the 5.9 GHz Band, U-NII devices, as an unlicensed service, must not cause interference to DSRC operations and must accept any interference from DSRC. Moreover, if they do cause interference, then U-NII devices must cease operating immediately. The Commission's *NPRM* recognizes this legal structure.[94] Maintaining a stable and reliable spectrum environment is a critical requirement to protect and provide certainty for the many critical DSRC safety applications and services that will soon operate in this spectrum band.

U-NII device compliance with Part 15 requirements provides no assurances that the proposed spectrum sharing in the 5.9 GHz can be successfully realized without harm to ITS/DSRC services and safety. The potential risk from harmful interference to primary users in shared bands is illustrated in the *NPRM* regarding Terminal Doppler Weather Radar ("TDWR") that holds primary status in the 5.60-5.65 GHz Band.[95] Field tests conducted by NTIA determined that TDWR operations were suffering interference from U-NII devices. Specifically,

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[92] *See generally* 47 C.F.R. Part 15.

[93] *NPRM* at ¶ 1.

[94] *Id.* at ¶¶ 1, 3, 101.

[95] *See NPRM* at ¶¶ 8-10.

according to the *NPRM*, it was found that U-NII devices not certified for operating in the 5.60 to 5.65 GHz Band were nonetheless doing so.[96] The Commission found that, in many cases, "the inference was caused by third parties modifying the device's software configurations to enable operation in frequency bands other than those for which the device had been certified but without meeting the technical requirements for operating in those frequency bands."[97] The interference problem to TDWR was first discovered in early 2009; resolution via revised compliance and measurement procedures for U-NII devices remains pending[98]some four years later.

Given the critical public safety applications associated with DSRC, careful scrutiny of the risks posed by potential U-NII sharing of the 5.9 GHz must be undertaken. The TDWR example illustrates that compliance with Part 15 technical requirements may not suffice to guarantee that DSRC devices will not suffer harmful interference from U-NII devices operating in the 5.9 GHz band, despite their legal status as "unlicensed" devices and DSRC's co-primary status. At this critical moment for DSRC deployment, the regulatory uncertainties arising from the *NPRM* potentially cast grave doubts in the minds of key decision makers, company planners and investors. This, in turn, poses an unintended and unwarranted risk of impeding the progress of DSRC deployment and potentially impairing the ability of NHTSA to reach its key decision expected later this year. Savari therefore urges this Commission to engage directly and pro-actively with public sector and private sector parties seeking to further deployment of DSRC to affirm that it will continue to provide a stable and secure platform in the 5.9 GHz band for DSRC deployment.

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[96] *Id*. at ¶ 9.

[97] *Id*.

[98] *Id.* at ¶ 10.

IV. THE NPRM'S PROPOSAL TO PERMIT SHARING OF THE 5.9 GHZ BAND BY UNLICENSED DEVICES IS UNSUPPORTED AND PREMATURE

In the Tax Relief Act, Congress expressly separated consideration of the 5.4 GHz and 5.9 GHz bands. It also provided NTIA eight months to compete a study of the feasibility of sharing the 5.4 GHz band; but, 18 months to complete a study of sharing of the 5.9 GHz Band. In addition, the Tax Relief Act required that the Commission commence a rulemaking for the 5.4 GHz band but imposed no such requirement on the 5.9 GHz band. In fact, Congress deleted initial language that called for the Commission to commence a rulemaking for the 5.9 GHz Band. The separate treatment accorded the two bands reflected Congress's intent that protection of the primary allocations of the 5.9 GHz band, especially DSRC, required full study and analysis that was not able to be completed in the same time frame as the 5.4 GHz band. NTIA's study considered both bands simultaneously; but, beyond identifying risks of sharing the DSRC band with unlicensed devices principally concluded that further and complete testing was required.

The *NPRM* suggests that U-NII devices may utilize both indoor and outdoor applications by proposing to apply U-NII-3 rules, as modified, to the 5.9 GHz Band (the proposed U-NII-4) band.[99] Specific technical emissions rules for U-NII operations are also proposed.[100] However, there is no technical proposal contained in the *NPRM* for band sharing, beyond the citation to the NTIA Report suggesting possible lines of investigation. The paucity of information in the *NPRM* raises at least two critical issues: (1) absent a specific sharing proposal that can be tested, it is impossible to reach a decision on radio emissions parameters which could be substantially influenced by any future sharing mechanism, and (2) commenters do not currently have a means

[99] *Id*. at ¶ 97.

[100] *Id*.

to analyze the potential for band sharing since there is no specific proposal or proposals. Given the complex issues raised and the critical developmental stage of DSRC for safety services, it is virtually impossible for the Commission to issue a defensible final rule based only on this *NPRM* and responding comments.

The NTIA Report postulates the potential that these U-NII devices may not be able to sense (and hence avoid) DSRC signals, are not being designed with knowledge of DSRC devices and present risks that U-NII devices may interfere with DSRC operations. There is much information sharing that needs to occur between the DSRC and U-NII communities in order to analyze and address the sharing risks raised in the NTIA Report and as may be otherwise identified. The *NPRM* poses technical questions regarding the optimal sharing technique (*e.g.*, sensing, geo-location, pilot channel).[101] Before addressing these issues, however, the Commission must first address risks identified by the NTIA Report and determine with reasonable certainty that sharing of the 5.9 GHz Band with unlicensed devices will *not* compromise the safety of the traveling public. Accordingly, the public record in this *NPRM*, while no doubt informative, cannot as a practical or legal matter form the basis for definitive action by the Commission to permit the entry of unlicensed devices into the 5.9 GHz band.

The proposal to share spectrum allocated for safety of life services with unlicensed devices faces a high burden of demonstrating that DSRC will not be compromised. That will require, as NTIA has previously found, a deliberative process that evaluates carefully and fully a necessary and robust testing protocol. Savari would welcome the opportunity to work with NTIA, the Commission and other stakeholders to explore testing and analysis on this matter, while cautioning against any final action in the absence of a full technical record. Moreover, the

[101] *Id*. at ¶¶ 105-108.

Commission must also recognize the threat that a prolonged regulatory proceeding could pose for the continuing viability of the 5.9 GHz band for DSRC services.

Respectfully submitted,

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